UNITED STATES PATENT AND TRADEMARK OFFICE

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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Application Number: 09/965,905
Filing Date: September 28, 2001
Appellant(s): WALACAVAGE ET AL.

Daniel H. Bliss (32,398)

For Appellant

EXAMINER'S ANSWER

This is in response to the appeal brief filed 4 June 2008 appealing from the Office action mailed

30 October 2007.

(1) Real Party in Interest

A statement identifying by name the real party in interest is contained in the brief.

(2) Related Appeals and Interferences

The examiner is not aware of any related appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

(3) Status of Claims

The statement of the status of claims contained in the brief is correct.

(4) Status of Amendments After Final

The amendment after final rejection filed on 4 February 2008 has not been entered.

The appellant's statement of the status of amendments after final rejection contained in the brief is correct.

(5) Summary of Claimed Subject Matter

The summary of claimed subject matter contained in the brief is correct.

(6) Grounds of Rejection to be Reviewed on Appeal

The appellant's statement of the grounds of rejection to be reviewed on appeal is correct.

(7) Claims Appendix

The copy of the appealed claims contained in the Appendix to the brief is correct.

(8) Evidence Relied Upon

Cynthia Erickson et al. "Simulation, Animation, and Shop-Floor Control", Proceedings of the

1987 Winter Simulation Conference, (1987), pp. 649-653

Todd LeBaron et al. "Emulation of a Material Delivery System", Proceedings of the 1998 Winter

Simulation Conference, (1998), pp. 1055-1060

(9) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims:

Claims 1, 10, 12, 20, and 21 are rejected under 35 U.S.C. § 102(b) as being anticipated by "Simulation, Animation, and Shop-Floor Control" by Cynthia Erickson et al.

Regarding claims 1, 12, and 21, Erickson discloses:

A method of part flow for a programmable logic controller logical verification system, said method comprising the steps of:

Constructing a simulation model of a manufacturing line using a computer [*"It is often desirable to link shop-floor hardware directly to a discrete-event simulation model or graphical animation."* (page 649, abstract); *"Emulation has been used to describe graphical systems*

displaying the current status of the manufacturing shop floor." (page 649, Introduction); *"...a*

simulation model of the physical system must be developed." (page 650, Testing Control Logic)];

Playing the simulation model by a PLC logical verification system on the computer and

viewing a flow of a part through the manufacturing line by a user [*"A second application of*

linking simulation and animation to shop-floor control is emulation. Rather than testing logic of

individual PLC's, emulation graphically depicts the current status of the manufacturing system.

This status is updated in real time as the simulation language uses the shop-floor interfaces to

detect changes in the system as processes are completed or new jobs arrive." (page 650,

Manufacturing System Emulation)]

wherein the PLC logical verification system dynamically interacts through input and

output with the simulation model to verify a PLC code of the manufacturing line [*"This type of*

emulation can be accomplished by directly interfacing the graphics to the logical control

sequences of the shop floor controllers. A logical step is to combine this technology with state-

or-the-art simulation capabilities, such that the data needs of a simulation run are derived from

both the shop-floor devices being modeled and the underlying simulation (language) itself. This

method requires an interface between a simulation language and factory-floor devices." (page

649, Introduction)];

Determining if the part flow represented in the simulation model is correct to the user

[*"Linking a simulation directly to a programmable logic controller (PLC) provides a means to*

test the control logic of the PLC... Once the control logic for the PLC has been written, it must

be debugged and tested... To verify PLC logic using simulation, a model of the physical system

must be developed; however, the timing of some events would be generated by the PLC." (pages

649-650, Testing Control Logic, entire section)];

Generating the PLC code if the part flow represented in the simulation model is correct

[*"Once the control logic for the PLC has been written, it must be debugged and tested..."* (page

650, Testing Control Logic)]; and

Using the generated PLC code and implementing the manufacturing line according to the

part flow simulation model [*"A primary application involves testing the planned control logic

for a specific manufacturing system."* (page 649, Abstract)].

Regarding claims 10 and 20, Erickson discloses modifying the part flow represented in

the simulation model if the part flow represented in the simulation is not correct [*"Second, a

simulation model of the physical system must be developed... It is then up to the simulation

program to read this register value, and process this change as a possible event generation in

the ongoing simulation."* (page 650, Testing Control Logic)].

**Claims 2-8 and 13-19 are rejected under 35 U.S.C. § 103(a) as being unpatentable

over Erickson in view of "Emulation of a Material Delivery System" by Todd LeBaron et

al.**

Regarding claims 2-8 and 13-19, Erickson teaches the limitations of the parent claims 1

and 12, respectively.

Regarding claims 2-5 and 13-16, LeBaron teaches selecting a part generator, generating a

part with the part generator, and identifying part locations of the generated part within the

manufacturing line [*"Emulation of the complex pick and pack conveyor system will be presented."* (page 1055, left column, Abstract); *"All of the components for a particular order are assigned and routed to a specific pack station."* (page 1055, right column, System Description); The analysis is conducted for a simulated 23-hour period (page 1060, left column, Analysis) which implicitly discloses the generation of components for a particular order so that the emulation can fulfill the order.].

Regarding "testing the generated part at the part location", the specification teaches this limitation as determining if the part is present or not present (specification as amended, page 12, lines 9-11). LeBaron discloses emulation of a pick and pack conveyor system and therefore implicitly discloses "testing the generated part at the part location" as the ability to detect if the part is present or not present is a basic underlying principle in the proper operation of a pick and pack conveyor system. Further emphasis of this is LeBaron's disclosure [*"The goal in developing algorithms was to process the required number of orders per day within the planned facility schedule. Fully utilizing the pack stations is key in accomplishing this goal."* (page 1057, right column, Problem Description)] that clearly implies that pack stations can determine whether a necessary generated part is present at that pack station.

Regarding claims 6-8 and 17-19, LeBaron teaches constructing records for the parts [*orders*] wherein the record has at least one resource and at least one capability [*"Historical data was used to generate daily order profiles (as in Table 1)."* (page 1057, right column, Problem Description); Table 1 shows records [*orders*] for the parts, including a resource [*Pick Station*] and a capability [*# Pick Types*]].

Erickson and LeBaron are analogous art because both are drawn to emulation of factory equipment including PLC control software.

It would have been obvious to a person of ordinary skill in the art to combine the teachings of Erickson and LeBaron because Erickson explicitly describes the need to model the physical system [*"...a simulation model of the physical system must be developed."* (Erickson, page 650, Testing Control Logic)] while LeBaron provides teachings related to forming a model of a material delivery system, as claimed. A person of ordinary skill in the art, attempting to apply the teachings of Erickson to an existing or planned material delivery system, would be motivated to use LeBaron's teachings to model that type of physical system. Doing so would reduce the trial and error involved in developing a model from scratch and benefit from the knowledge available in the prior art.

Therefore it would have been obvious to a person of ordinary skill in the art at the time of Applicants' invention to combine the teachings of Erickson and LeBaron to arrive at the invention specified in claims 2-8 and 13-19.

(10) Response to Argument

Argument 1

Referring to claims 1 and 10, Appellants argue primarily that:

Erickson et al. lacks playing a simulation model by a PLC logical verification system on a computer and viewing a flow of a part through a manufacturing line by a user, wherein the PLC logical verification system dynamically interacting through input and output with the simulation model to verify a PLC code of the manufacturing line. In Erickson et al., there is no PLC logical verification system and the simulation model is linked directly with one or more hardware PLCs to test the control logic of the PLC. (emphasis added by Appellants; Brief, page 14)

The Examiner respectfully traverses this argument as follows.

Erickson expressly discloses a <u>PLC logical verification system</u> by stating *"Linking a simulation directly to a **programmable logic controller (PLC)** provides a means to test the control logic of the PLC. [...] Once the control logic for the PLC has been written, it must be debugged and tested. Currently, much of this **verification** takes place on the shop floor once the manufacturing system is in place. [...] To verify the PLC logic using simulation, a model of the physical system must be developed; however, the timing of some events would be generated by the PLC."* (emphasis added; pages 649-650, "2. Testing Control Logic")

Erickson expressly discloses <u>the PLC logical verification system dynamically interacting</u> <u>through input and output with the simulation model to verify a PLC code</u> by stating *"To verify the PLC logic using simulation, a model of the physical system must be developed; however, **the timing of some events would be generated by the PLC**."* (emphasis added; pages 649-650, "2. Testing Control Logic") and by stating *"A second application of linking simulation and animation to shop-floor control is emulation. [... The status of the manufacturing system] is updated in real time as **the simulation language uses the shop-floor interfaces** to detect changes in the system as processes are completed or new jobs arrive."* (emphasis added; page 650, "3. Manufacturing System Emulation").

Finally, Erickson is expressly directed to modeling <u>a manufacturing line</u> by disclosing *"Simulation analysis and, more recently animation have become powerful tools in manufacturing systems analysis."* (page 649, "1. Introduction", et seq.).

Therefore Erickson discloses the <u>PLC logical verification system dynamically interacting through input and output with the simulation model to verify a PLC code of the manufacturing line</u> as claimed.

Appellants' remarks continue to characterize the Erickson reference in light of a Wikipedia website definition. This argument is unpersuasive because the Erickson reference is unambiguous in its disclosure and because the particular Wikipedia definition, date of that definition, and accuracy of that definition are unclear. Appellants further attempt to distinguish the invention from the prior art based on counsel's remarks rather than the deliberate language of the claims which is unpersuasive.

Appellants reiterate this argument for claims 12 and 20 (Brief, page 16). This argument is unpersuasive for the reasons set forth above. Additionally, Appellants request that the Examiner enter an amendment to correct the parent claim referred to by claim 20 from 1 to 12. Entering such an amendment at the present time would not change any of the pending grounds of rejection. The Examiner declines to enter this amendment before receiving a decision from the Board.

Argument 2

Referring to claim 21, Appellants argue primarily that:

Erickson et al. lacks constructing a simulation model of a part flow in a manufacturing line using a computer by selecting a part generator, generating a part with the part generator, and identifying part locations of the part in the manufacturing line. (Brief, page 20)

The Examiner respectfully traverses this argument as follows.

Erickson clearly discloses <u>identifying part locations of the part in the manufacturing line</u> by stating *"For example, a limit switch is tripped as a part is detected; this input is detected by the PLC's I/O scanner which then updates a register value (sets a bit high or increments a counter) in the PLC's memory. It is then up to the simulation program to read this register value, and process this change as a possible event generation in the ongoing simulation."* (page 650, "2. Testing Control Logic").

Erickson implicitly discloses <u>selecting a part generator</u> and <u>generating a part with the part generator</u> by providing the above disclosure of part locations in the manufacturing line, especially in conjunction with disclosure such as *"A second application of linking simulation and animation to shop-floor control is emulation. Rather than testing logic of individual PLCs, emulation graphically depicts the current status of the manufacturing system. This status is updated in real time as the simulation language uses the shop-floor interfaces to detect changes in the system as processes are completed or new jobs arrive."* (page 650, "3. Manufacturing System Emulation") and *"Emulation has been used to describe graphical systems displaying the current status of the manufacturing shop floor. This type of emulation can be accomplished by directly interfacing the graphics to the logical control sequences of the shop floor controllers."* (page 649, "1. Introduction"). Erickson explicitly discloses a graphical simulation model of a part flow in a manufacturing line and explicitly discloses identifying part locations of parts in the manufacturing line (and updating the simulation model in response to the identified part location). Erickson also explicitly discloses the arrival of "new jobs". Clearly these parts in the simulation model, corresponding to actual parts in the real manufacturing line, must be <u>generated</u> in order to exist in the simulation model, thus Erickson discloses <u>generating a part</u>. Further,

some part of the computer system is responsible for generating that part, thus Erickson discloses

<u>a part generator</u>. A part generator generating a part is necessary and inherent component of a

simulation of a manufacturing line simulating the flow of a part through that manufacturing line.

Argument 3

Referring to claim 21, Appellants argue primarily that:

Erickson et al. also lacks playing the simulation model of the part flow by a PLC logical
verification system on the computer to move the generated part to and from locations
within the manufacturing line and viewing a flow of the part through the manufacturing
line by a change of color at any of the part locations by a user, wherein the PLC logical
verification system dynamically interacting through input and output with the simulation
model to verify a PLC code of the manufacturing line.

The Examiner respectfully traverses this argument as follows.

The majority of this claim language has been addressed above in the context of claims 1,

10, 12, and 20.

Erickson discloses playing the simulation model of the part flow on the computer to

move the generated part to and from locations within the manufacturing line by stating *"A*

second application of linking simulation and animation to shop-floor control is emulation.

Rather than testing logic of individual PLCs, emulation graphically depicts the current status of

the manufacturing system. [...] The primary use of emulation is for remote monitoring of the

system's functions, in which a graphically display on an office desk might provide information

about system faults, switches sticking, buffers overflowing, etc." (page 650, "3. Manufacturing

System Emulation").

Erickson explicitly discloses <u>animation</u> on a computer display. Regardless of any explicit

disclosure of the use of color, as is well known in the arts of computer graphics, every pixel in a

computer display must be assigned some color or another. Thus in a monochrome display, the animation of even a simple object requires changing the color the appropriate dots making up the overall display to reflect a moving object. That is, it would be impossible to disclose <u>animation on a computer display</u> without also inherently disclosing <u>a change of colors,</u> because it is only through assigning colors can a computer display be useful. Thus Erickson discloses <u>viewing a flow of the part through the manufacturing line by a change of color at any of the part locations</u>.

The remainder of Appellants' argument has been addressed above.

Appellants' arguments have been fully considered but have been found unpersuasive. For the reasons shown above, Erickson anticipates claims 1, 10, 12, 20, and 21.

Argument 4

Referring to dependent claims 2-8, Appellants remarks from pages 22-29 appear to summarize the claim language, summarize the prior art references, and allege that the prior art references do not teach the claim language. Attorney argument is not evidence unless it is an admission (MPEP 2145 (I)). Several of Appellants' allegations have been addressed above. Several more of the allegations remain unsupported by any argument other than the generic allegation that the prior art fails to teach the recited claim language. These allegations are refuted by the citations and rationale found in the Final Rejection.

Appellants' arguments regarding the deficiencies of the teachings of the prior art appear to merely combine every limitation recited by every dependent claim and allege, without any

support, that the prior art fails to teach this new aggregate of claim limitations. For example, on page 27, beginning with "There is absolutely <u>no teaching</u> of a level of skill in the programmable logic controller and vehicle manufacturing art," Appellants argue that the prior art fails to teach a combination of limitations found in claims 1-8, although <u>no such claim has been presented for examination</u>. For example, this argument combines limitations of claim 8 ("wherein the at least one resource has at least one capability") with limitations of claim 5 ("testing the generated part at the part locations"), although there is no dependency relationship between these claims save for the independent claim 1.

In response to this argument, the Examiner refers to the citations and rationale provided in the Final Rejection.

On page 28, Appellants argue that:

Even if the references could be combined, they do <u>not</u> teach a level of skill in the art of programmable logic controllers of selecting a part generator, generating the part with the part generator, identifying part locations of the generated part within the manufacturing line, testing the generated part at the part locations, constructing a record for the part wherein the record has at least one resource and wherein the at least one resource has at least one capability.

The Examiner respectfully traverses this argument as follows.

Once again, this argument combines limitations found in claims 2-8, although <u>no such claim has been presented for examination</u>. Further, the Final Rejection clearly shows where the prior art teaches these limitations.

For example, Erickson teaches selecting a part generator, generating a part with the part generator, and identifying part locations of the generated part within the manufacturing line as set forth above.

Further, LeBaron teaches selecting a part generator, generating a part with the part

generator, and identifying part locations of the generated part within the manufacturing line

[*"Emulation of the complex pick and pack conveyor system will be presented."* (page 1055, left

column, Abstract); *"All of the components for a particular order are assigned and routed to a*

specific pack station." (page 1055, right column, System Description); The analysis is conducted

for a simulated 23-hour period (page 1060, left column, Analysis) which implicitly discloses the

generation of components for a particular order so that the emulation can fulfill the order.].

Regarding "testing the generated part at the part location", Appellants' specification

teaches this limitation as determining if the part is present or not present (specification as

amended, page 12, lines 9-11). LeBaron discloses emulation of a pick and pack conveyor system

and therefore implicitly discloses "testing the generated part at the part location" as the ability to

detect if the part is present or not present is a basic underlying principle in the proper operation

of a pick and pack conveyor system. Further emphasis of this is LeBaron's disclosure [*"The*

goal in developing algorithms was to process the required number of orders per day within the

planned facility schedule. Fully utilizing the pack stations is key in accomplishing this goal."

(page 1057, right column, Problem Description)] that clearly implies that pack stations can

determine whether a necessary generated part is present at that pack station. Further, according

to Appellants' specification, Erickson also teaches testing the generated part at the part location

(Erickson, page 650, "2. Testing Control Logic").

LeBaron teaches constructing records for the parts [*orders*] wherein the record has at

least one resource and at least one capability [*"Historical data was used to generate daily order*

profiles (as in Table 1). " (page 1057, right column, Problem Description); Table 1 shows records

[*orders*] for the parts, including a resource [*Pick Station*] and a capability [# *Pick Types*]].

Appellants further argue that:

In addition, the Examiner has adduced no factual basis to support his/her position that it would have been obvious to one of ordinary skill in the art to combine the teachings of Erickson and LeBaron because Erickson describes the need to model the physical system while LeBaron provides teachings related to forming a model of a material delivery system in order to reduce the trial and error involved in developing a model from scratch and benefit from the knowledge available in the prior art. Thus, the Examiner's stated conclusion of obviousness is based on speculation, unfounded assumptions or hindsight reconstruction to supply deficiencies in the factual basis.

The Examiner respectfully traverses this argument as follows.

The Examiner submits that "a material delivery system" described by LeBaron is

precisely the type of "physical model" contemplated by Erickson. That is, Erickson explicitly

teaches the importance of modeling the manufacturing system that currently exists or which one

intends to build (Erickson, page 650, "4. Simulating Ahead from Current Shop-Floor Status").

LeBaron explicitly teaches one particular type of manufacturing system, "a material delivery

system". A person of ordinary skill in the art who either has a material delivery system or is

considering building a material delivery system (motivated by all the advantages of having a

material delivery system, such as benefiting from an efficient system for delivering materials)

would recognize the advantages of using a model like Erickson's to verify the PLC logic used in

the material delivery system.

Appellants reiterate these arguments for claims 13-19. These arguments are similarly

unpersuasive.

Appellants' arguments have been fully considered but have been found unpersuasive. For the rationale set forth above and in the Final Rejection, claims 2-8 and 13-19 are obvious over Erickson in view of LeBaron.

(11) Related Proceeding(s) Appendix

No decision rendered by a court or the Board is identified by the examiner in the Related Appeals and Interferences section of this examiner's answer.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

Jason Proctor, Examiner

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